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city of san luis obispo

GENERAL PLAN SAFETY ELEMENT



July 2000



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COMMUNITY DEVELOPMENT DEPARTMENT

OUR MISSION STATEMENT

Our mission is to serve all persons in a positive and courteous manner and help ensure that San Luis Obispo continues to be a healthy, safe, attractive, and enjoyable place to live, work, or visit. We help plan the city's form and character, support community values, preserve the environment, promote wise use of resources, and protect public health and safety.

OUR SERVICE PHILOSOPHY

The City of San Luis Obispo Community Development Department staff provides high quality service when you need it. We will:

- Listen to understand your needs;
- Give clear, accurate and prompt answers to your questions;
- Explain how you can achieve your goals under the City's rules;
- Help resolve problems in an open, objective manner;
- Maintain high ethical standards; and
- Work to improve our service.

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Hazard information developed in conjunction with:
Fugro-West

Crawford, Multari, Clark, and Mohr
County of San Luis Obispo Department of Planning & Building
Cal Poly San Luis Obispo Landscape Architecture Department

The City's General Plan is made up of sections called "elements." Each element focuses on certain topics as required or allowed by State law. According to State law, each element has equal weight in defining City policies. In November 1999, the following elements comprised the City's General Plan.

Title	Adoption or Last Major Revision Date
Land Use	1994
Housing	1994
Open Space	1994
Circulation	1994
Noise	1996
Safety	2000
Conservation*	1973
Energy Conservation*	1981
Parks & Recreation	1995
Water & Wastewater Management	1994

*Revision in progress.

This update of the Safety Element was adopted July 5, 2000,
by City Council Resolution No. 9063.

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Page 7, Bishop Peak prescribed burn: Tom Zeulner, City of San Luis Obispo Fire Department

Page 9: Historical Museum retrofit: Glen Matteson, City of San Luis Obispo Community Development Department

Page 13: Soil slippage: Glen Matteson, City of San Luis Obispo Community Development Department

Page 15: Diablo fuel rack: Jayson Mellom, The Tribune

Page 17: Hazardous materials incident: David Middlecamp, The Tribune

Page 18: Power lines: Glen Matteson, City of San Luis Obispo Community Development Department

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INTRODUCTION

Safety as a General Plan Topic

The City's General Plan guides the use and protection of various resources to meet community purposes. It reflects consensus and compromise among a wide diversity of citizens' preferences, within a framework set by State law. The General Plan consists of sections, called elements, which focus on certain topics.

In 1975 the California Legislature made a safety element and a seismic safety element mandatory parts of the General Plan. Cities and counties were to adopt, at a minimum, policies concerning fire, flooding, and geologic hazards. San Luis Obispo adopted its first Seismic Safety Element in 1975, and its first Safety Element in 1978. In 1984 the Legislature expanded the list of hazards that were to be covered and encouraged their combination in a single element. According to the legislation, the safety element should provide direction to help reduce death, injuries, property and environmental damage, and the economic and social dislocation resulting from natural hazards. While the element is required to focus on fire, flooding, geologic, and seismic hazards, jurisdictions may address any relevant safety issues that are considered important.

This Safety Element focuses on achieving acceptable levels of risk through decisions on land use and the form of development, with consideration for the closely related factor of transportation. Other public efforts deal with other types of threats to health and safety, such as crime, use of alcohol, tobacco, and other drugs, exposure to ultraviolet light, the use of weapons, and the design and operation of vehicles. The Land Use Element of the General Plan prescribes land uses within the planning area, as well as standards for population density and building intensity. To avoid unacceptable risk, the Land Use Element must respond to the hazard evaluation of the Safety Element. By limiting development intensity in areas that may be subject to significant geologic and other hazards, risks can be minimized. One of the purposes of the Open Space Element is to preserve open land for public health and safety.

This Safety Element provides a broad survey of hazards in the San Luis Obispo area, to be used for general land use planning. This information does not take the place of site evaluations by qualified professionals. Several of this element's goals, policies, and programs will be implemented through City review of individual development proposals and site assessments.

In the General Plan, a *goal* is the desired end state or condition that the community would like to achieve. A *policy* describes an approach to achieving the goals. A program is a specific action the City intends to take to implement policies. Numbering of goals, policies, and programs is for ease of reference, and does not imply relative importance.

The Nature of Risk

People living, working, or visiting in San Luis Obispo are subject to a variety of hazards. San Luis Obispo wants to avoid the loss of life, property, and prosperity that can result from disasters, and to accomplish a rapid recovery from unavoidable disasters. Some hazards are caused by natural processes, some by people's activities, and many by a combination of both factors. Natural hazards are processes such as earthquakes, landslides, flooding, and lightning-set fires, which have been occurring for millions of years. They have helped create the landscape of San Luis Obispo, and become disasters only when they disrupt people's lives. Other hazards result from technology, such as aircraft crashes and the use and transport of

toxic materials. Many disasters result from a combination of natural processes and people's choices: developing in flood-prone areas; grading that triggers landslides; building and occupying structures that collapse in an earthquake. People have become so dependent on the benefits of modern technology that it would be undesirable to eliminate man-made hazards. Usually, little can be done to prevent natural disasters. (However, there is mounting evidence that human activity is changing the atmosphere, resulting in global warming that may cause more extreme weather conditions, and therefore risks of flooding and wildland fire, in Central California. Reducing "greenhouse" gas emissions may therefore reduce the severity of some disasters.)

To minimize loss from disasters, resources must be committed. While it would be desirable to provide the maximum level of safety for all hazards, this is generally not feasible. Resources for disaster avoidance, preparedness, and recovery compete with desires for other services. Community efforts to avoid unacceptable risks may conflict with individual's desires to use land in certain ways. So, risk-control standards must meet the constitutional test of proper regulation: that there is a clear connection between regulation and the public purpose it serves.

The community can define acceptable risk levels and make choices to achieve them. Risk is part of everyday life. Almost all activities have some degree of risk, and there is no hazard-free environment. The cost of providing protection generally increases with the severity of the hazard and the level of risk reduction that is desired. At some point, the cost of providing protection – either in dollars or in opportunities foregone– becomes prohibitive when compared to the benefits derived. "Acceptable risk" is the level of risk below which no specific action by government is deemed necessary to protect life and property. "Unacceptable risk" is the level of risk above which specific action by government is deemed necessary to protect life and property.

An "avoidable risk" is one that can be eliminated while achieving other individual or public objectives.

Scientific expertise can predict the magnitude of a disaster and its probable effects, and can estimate the probability that it will occur. But the public ultimately decides what level of risk is acceptable as well as the acceptable methods for avoidance and protection. In evaluating acceptable risk, the following factors are considered:

- *Severity of loss:* Will the loss from an event be large or small? Consequences include injury, loss of life, property, and function, and environmental damage.
- *Probability of loss:* How often is the event expected to occur? Many disasters have an inverse relationship between magnitude and frequency: small losses occur frequently, large ones less often.
- *Capacity to reduce risk:* What methods and resources are available to reduce the risk?
- *Adequacy of knowledge:* How well do we understand the magnitude of the loss-causing event, its consequences, and the probability of it occurring?

Additional information on hazards in the San Luis Obispo area can be found in the Technical Background Report for the San Luis Obispo County and Cities Safety Element (June 1999).

SAFETY GOALS

Goal 1: *Minimize injury and loss of life.*

Goal 2: *Minimize damage to public and private property.*

Goal 3: *Minimize social and economic disruptions resulting from injury, death, and property damage.*

FLOODING

Flooding occurs in response to heavy rainfall, when creeks and drainage channels overflow. Flooding may also occur in low-lying areas that have poor drainage, or when culverts become blocked, even during moderate storms. Flood severity can be increased by fires in the watershed, structures or fill placed in flood-prone areas, and increased runoff resulting from development of impervious surfaces (such as parking lots, roads, and roofs). Flood plains are usually described as the area that has a one percent chance of being submerged in any year, which is often called the "100-year flood."

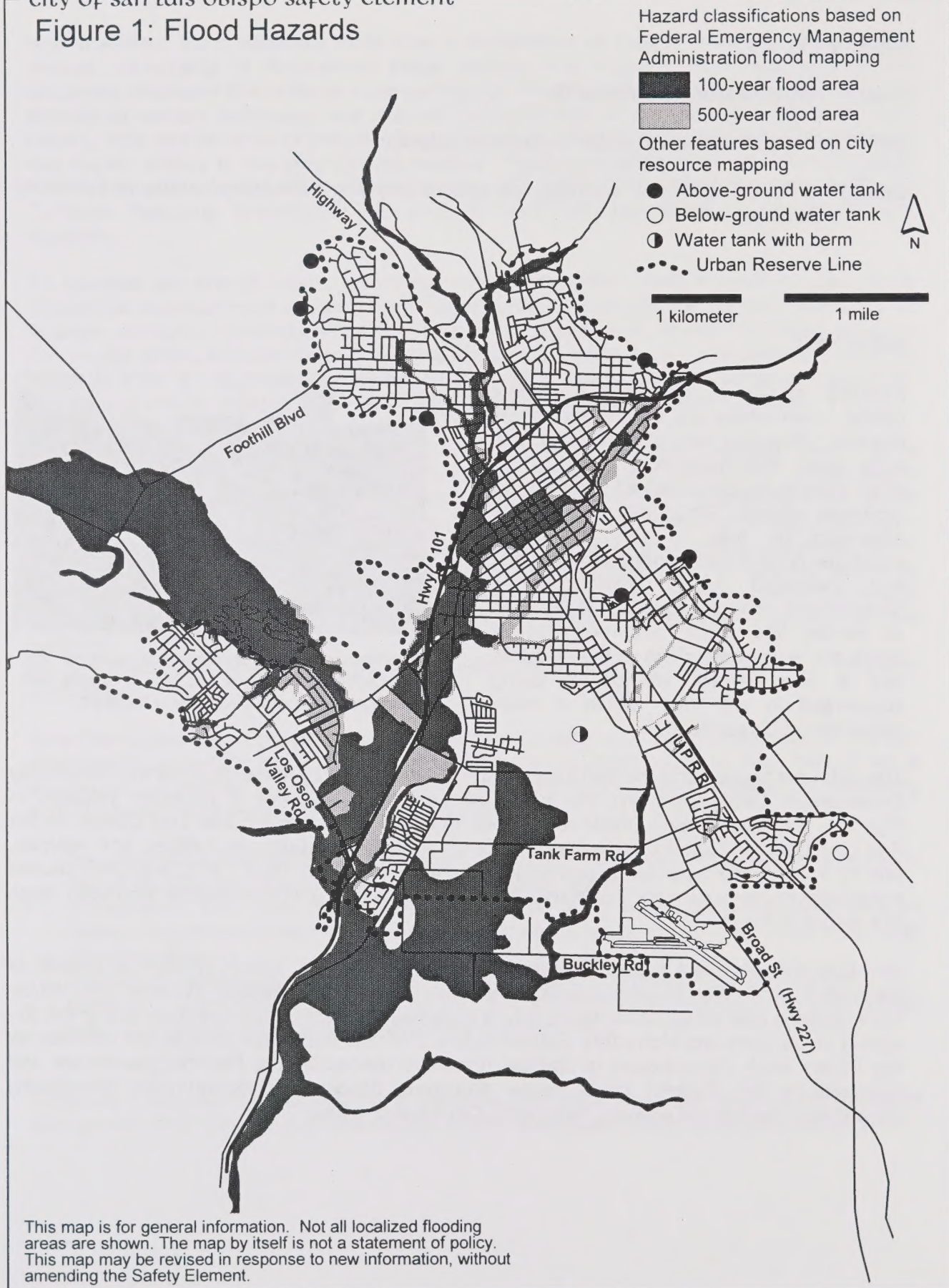


In February 1995, floodwaters covered the intersection of Higuera and Marsh streets and damaged several businesses in the area.

The 100-year floodplain in the San Luis Obispo area is shown by maps on file at the Community Development Department and the Public Works Department, and is generally indicated in Figure 1. San Luis Obispo Creek and several tributaries flow through San Luis Obispo. In the San Luis Obispo area, floods cause damage by submerging structures, utilities, and vehicles, and by eroding channels and undermining structures. Floods in 1969, 1973, and 1995 caused substantial property damage. Local waterways typically reach and then decline from flood stage in a matter of hours.

San Luis Obispo is not subject to inundation from dam failure, beach erosion, or coastal or lakefront flooding due to earthquake-induced waves (tsunami or seiche). However, the Whale Rock pipeline that brings water to the city is potentially subject to damage from tsunami in the vicinity of Cayucos and Morro Bay. Sudden failure of Whale Rock Dam (owned and operated by the Whale Rock Commission) or Salinas Reservoir (owned by the Federal government and operated by the County) could cause disastrous flooding for communities immediately downstream, and would severely reduce the City's water supply.

Figure 1: Flood Hazards



Several large tanks on hillsides around the city store treated water for domestic use and fire suppression (Figure 1). A strong earthquake could damage the tanks. Sudden failure of such a tank, which is very unlikely, would cause localized flooding and erosion immediately downstream from the tank, in addition to interrupting water distribution. The tanks located on the South Hills and on Islay Hill, which were set into the ground partly for esthetic reasons, pose a minimal hazard.

The City's Flood Damage Prevention Regulations and Federal Flood Insurance standards require new building floors to be above the 100-year flood level, while not displacing floodwaters in a way that would raise flood levels. They also are intended to keep floating debris and other made-made obstructions out of floodways.

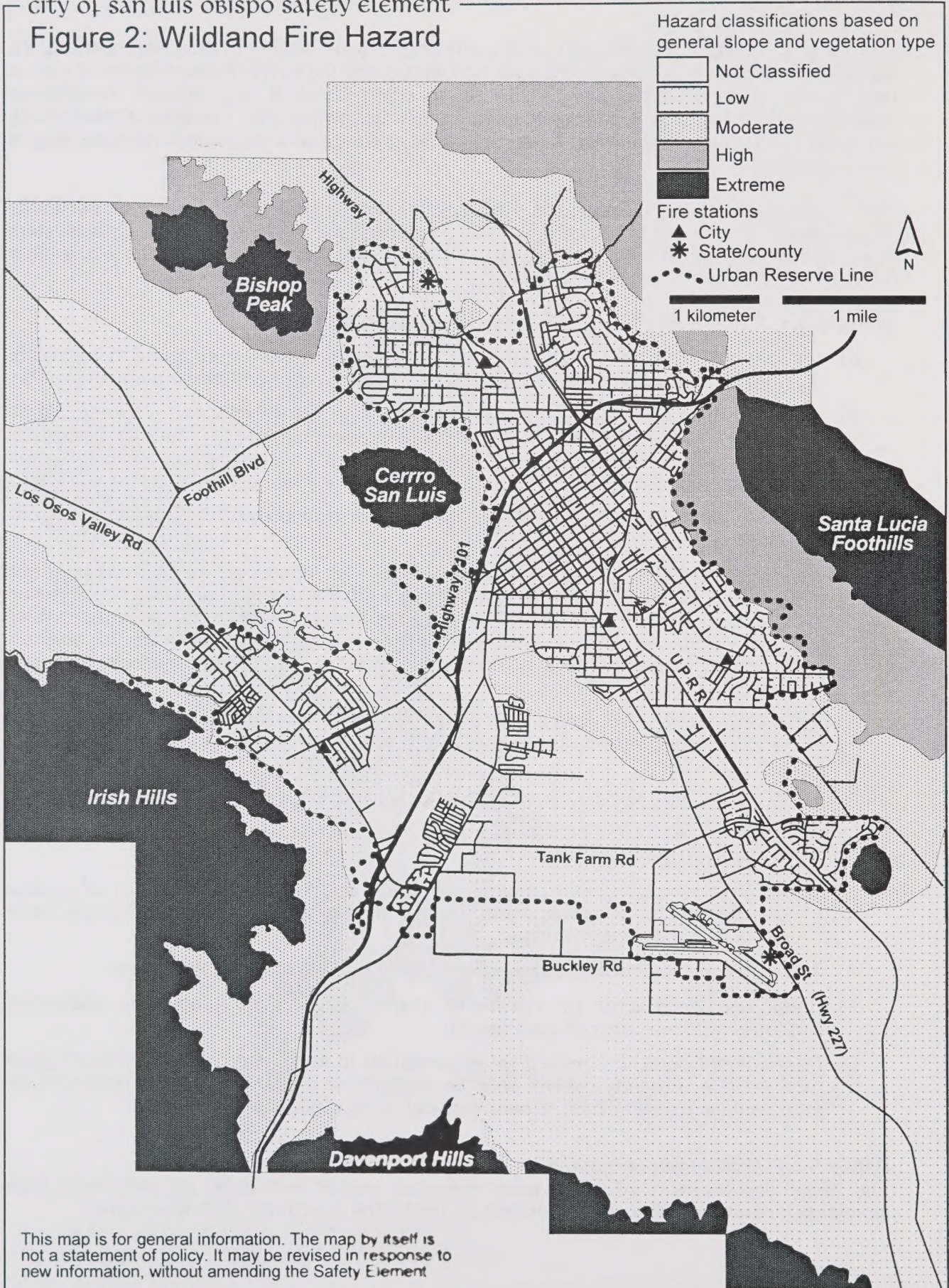
Policy S 1.1: Flood Hazard Avoidance and Reduction

- A) *The City will develop and carry out environmentally sensitive programs to reduce or eliminate the potential for flooding in previously developed, flood-prone areas of the city.*
- B) *The City should allow flood waters to move through natural channels. Flow should be accommodated by removing debris and man-made obstructions. The City recognizes that many natural channels cannot contain runoff from a storm greater than a 25-year event. Areas flooded by storms as large as a 100-year event will be mapped.*
- C) *No new building or fill should encroach beyond, or extend over, the top-of-bank of any creek.*
- D) *Within predominantly developed areas (such as downtown) infill, remodel, and replacement projects should not displace more flood water than previous structures on the site or in the vicinity. Commercial buildings may be flood-proofed where providing floor levels above the 100-year storm flow is not appropriate due to adjacent improvements. New infill buildings may be required to have greater setbacks than their older neighbors.*
- E) *Within new development areas, such as the potential expansion areas shown in Figure 2 of the Land Use Element, substantial displacement of flood waters should be avoided by:*
 - 1) *Keeping a substantial amount of flood-prone land in the vicinity as open space;*
 - 2) *Enlarging man-made bottlenecks, such as culverts, which contribute to flood waters backing up from them;*
 - 3) *Accommodating in such places uses which have relatively low ratios of building coverage to site area, for which shallow flooding of parking and landscape areas would cause minimum damage.*
 - 4) *Requiring new buildings to be constructed above the 100-year flood level.*
- F) *Creek alterations shall be considered only if there is no practicable alternative, consistent with the Open Space Element.*
- G) *Development close to creeks shall be designed to avoid damage due to future creek bank erosion. Property owners shall be responsible for protecting their developments from damage caused by future bank loss due to flood flows.*

Policy S 1.2: Water Impoundments

The design and review of proposed water reservoirs, ponds, and tanks, will conform to State standards for seismic safety and will include an evaluation of potential inundation areas.

city of san luis obispo safety element
Figure 2: Wildland Fire Hazard



This map is for general information. The map by itself is not a statement of policy. It may be revised in response to new information, without amending the Safety Element

FIRE

Fires cause significant losses to life, property, and the environment. They occur in both urban and rural settings. Urban fire hazards result from the materials, size, and spacing of buildings, and from the materials, equipment, and activities they contain. Additional factors are access, available water volume and pressure, and response time for fire fighters. Fire hazards in rural areas, or on the edge between urban and rural land, combine these factors with land slope and natural and modified vegetation. The mosaic of grassland, scrub and chaparral, and oak woodland around San Luis Obispo has been shaped by, and to some extent depends on, fire. Where the burning of natural vegetation is a threat to people's lives and property, plant fuels are often managed by replacement planting, cattle grazing, plowing, or controlled burns.



At the start of the rainy season in Fall 1999, the City conducted a prescribed burn on the Bishop Peak natural preserve, to reduce fuel accumulation and the risk of uncontrolled fire.

"Wildland" is a shorthand way of referring to conditions mostly resulting from natural vegetation's properties as fuel and the steepness of the land, which affect how fast fire spreads and limit fire-fighting methods. San Luis Obispo faces wildland fire hazards due mainly to its climate and to the hills around and within the city. Areas with high wildland fire hazard include the Irish Hills, Santa Lucia foothills, Cerro San Luis Obispo, Bishop Peak, and Islay Hill (Figure 2):

Urban fire hazards are increased by concentrations of wood-frame structures, particularly multifamily developments, mobile homes, and older structures having outdated heating and electrical systems and lacking fire-detection and suppression features.

Preventing the start and spread of fires was one of the original purposes of building and zoning regulations. San Luis Obispo has adopted fairly typical zoning regulations for building size and spacing, and standard codes that address fire safety in detail. In addition, the city has adopted requirements for automatic fire sprinklers and fire-resistive roof materials that exceed minimum statewide requirements.

Fire prevention and suppression services are provided by the City Fire Department, which maintains four fire stations (Figure 2). A key challenge for the City is providing adequate fire protection for the expansion areas identified in the Land Use Element, in particular the existing development to be annexed as part of the Airport Area.

Policy S 2.1: Adequate Fire Services

Development should be approved only when adequate fire suppression services and facilities are available or will be made available concurrent with development, considering the setting, type, intensity, and form of the proposed development.

Policy S 2.2: Wildland Fire Safety

A) *Wildland fire hazards shall be classified as follows:*

Classification	Vegetation	Slope
Low	extensive urban development or vacant land with minimal vegetation; most urban ornamental landscaping; extensive surface water; perennial wetlands; row crops; orchards and vineyards with no understory grass or brush; irrigated or closely grazed pasture; extensive rock or sand	any slope
	grasslands; oak woodland ("savannah" type, excluding chaparral); cactus scrub	0 to 40 percent
	riparian dominated by willows, sycamore, oak	0 to 40 percent
Moderate	grasslands; oak woodland ("savannah" type, excluding chaparral); cactus scrub	40 to 60 percent
	riparian dominated by willows, sycamore, oak	40 percent or more
	riparian dominated by bay, conifers	0 to 40 percent
	orchards and vineyards with some understory grass or brush	0 to 60 percent
High	grasslands; oak woodland ("savannah" type, excluding chaparral); cactus scrub	61 percent or more
	chaparral and scrub (excluding cactus scrub)	0 to 40 percent
	riparian dominated by bay, conifers	40 to 60 percent
	orchards and vineyards with some understory grass or brush	61 percent or more
	extensive stands of eucalyptus or coniferous trees	0 to 60 percent
Extreme	grasslands	61 percent or more
	chaparral and scrub (excluding cactus scrub)	41 percent or more
	riparian dominated by bay, conifers	61 percent or more
	extensive stands of eucalyptus or coniferous trees	61 percent or more
Notes: When classifying areas of several hectares (acres) having a strip, patch, or small-scale mosaic of vegetation and slope types, the most severe classification that is generally represented within the adjacent types shall be used. Unusual conditions, such as a wetland's accumulation of dried reeds during a prolonged drought, may result in a vegetation type temporarily having a higher actual hazard than indicated by its classification, which reflects the typical cycle of seasonal conditions.		

- B) *Development shall be excluded from areas of high and extreme wildland fire hazard.*
- C) *Buildings that are in areas of moderate fire hazard and which are close to areas of high or extreme fire hazard shall have non-combustible exteriors; noncombustible exteriors are encouraged for all buildings in moderate fire hazard areas.*
- D) *In areas of moderate or higher wildland fire hazard, defensible space –accessible space free of highly combustible vegetation and materials– shall be provided around all structures.*
- E) *It is recognized that vegetation types, and therefore wildland fire hazards, may change due to natural causes and human activity. Changes are expected to be minimal in areas that the Land Use Element designates as Open Space. Substantial changes are expected in areas that the Land Use Element designates for development. Any losses of native plant habitat must be mitigated as required by the Open Space Element.*

EARTHQUAKES AND OTHER GEOLOGIC HAZARDS

Overview

Geologic conditions encompass the form of the ground surface, the composition of soils, rocks, and water at the ground surface and below, and the long-term movement of the Earth's crust and mantle. These conditions determine the stability of the ground at a site, and how that site will respond to changes caused by people and by the natural forces of earthquakes and weather.

The frequency and strength of earthquakes depend on the number and type of faults that pass through an area. San Luis Obispo is located in a geologically complex and seismically active region. Seismic conditions here have the potential to result in significant harm to people and property. Some fault locations and characteristics have been identified. However, recent earthquakes in California have shown that not all active faults are revealed by surface features.



In February 2000, a City project was underway to strengthen the Historical Museum against earthquakes and to make other improvements.

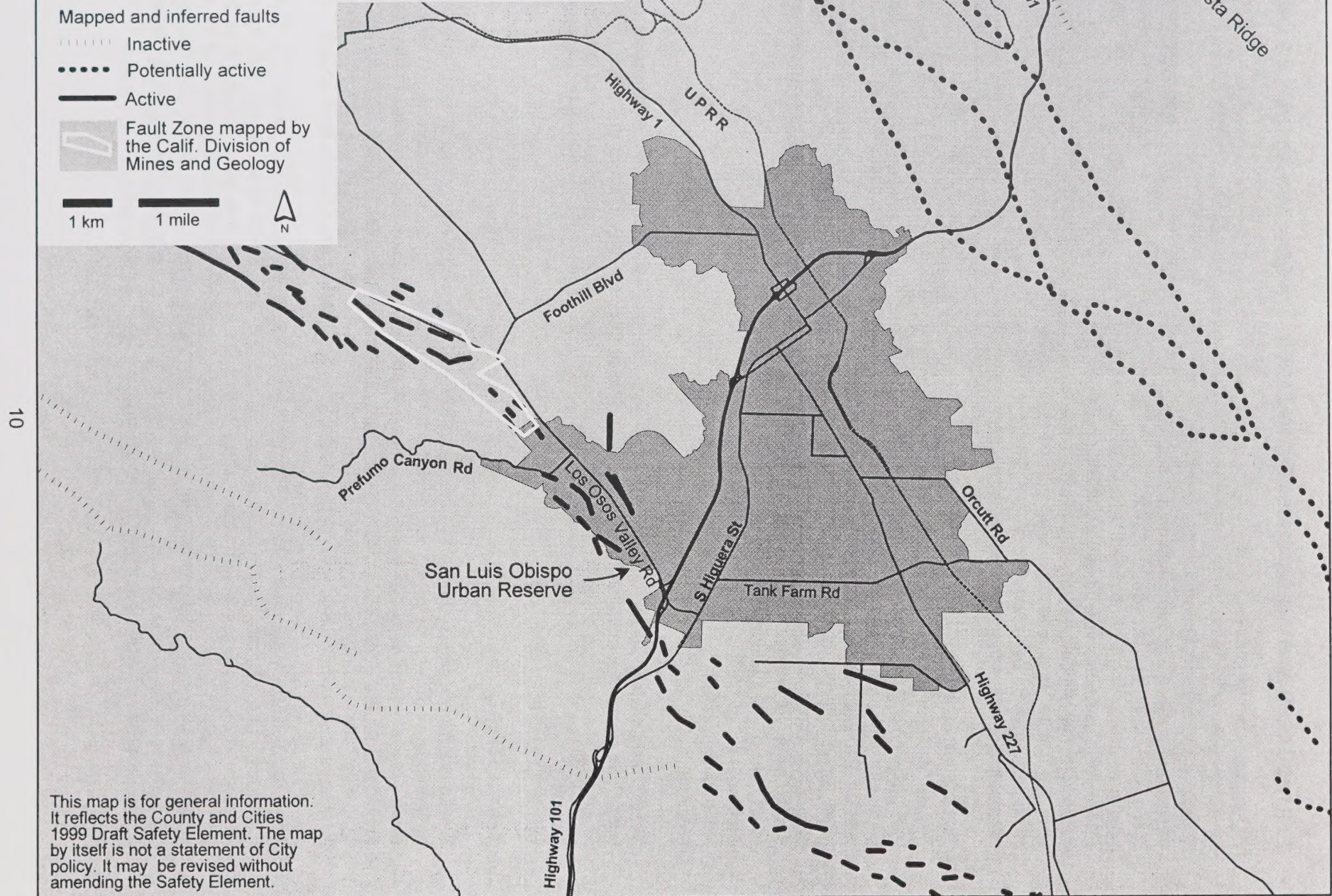
Safety precautions should be based on known factors, as well as an awareness of the limitations to current knowledge. The Safety Element must consider two of the direct effects of an earthquake: rupture of the ground surface along a fault, and ground shaking that results from fault movement. Other hazards associated with earthquakes are settlement, liquefaction, landslide, collapse of structures, fires, and flooding from dam failure.

Surface Rupture

Surface rupture refers to the top of the ground moving unevenly along a fault: one side moves horizontally, vertically, or both, with respect to the other side. It typically occurs within an area of linear traces along previous ruptures, which mark a fault zone, and often in concert with movement on adjacent or intersecting faults. Rupture of the ground surface along a fault trace typically occurs during earthquakes of about magnitude 5 or greater. Surface rupture endangers life and property when structures or lifeline facilities are located on, or cross over, a fault.

The Los Osos Fault, adjacent to the City of San Luis Obispo, is identified under the State of California Alquist-Priolo Fault Hazards Act (Figure 3). This fault's main strand lies near the intersection of Los Osos Valley Road and Foothill Boulevard. It has been classified as active within the last 11,000 years. Additional site-specific studies may find other segments of the fault, in which case it would be appropriate for the California Department of Mines and Geology to expand the zone. The Los Osos Fault presents a high to very high fault rupture hazard to development and facilities in the Los Osos Valley.

Figure 3: Earthquake Faults - Local Area



Other faults in the vicinity of San Luis Obispo are the West Huasna, Oceanic, and Edna faults. These faults are considered potentially active and present a moderate fault rupture hazard to developments near them. Figure 3 shows the locations of faults in the immediate San Luis Obispo area.

Ground Shaking

Ground shaking refers to the vibration that occurs in response to displacement along a fault. Typically, ground shaking has a side-to-side component as well as a vertical component, with the actual movement depending on the type of fault, a site's distance from the fault, and the rock and soil conditions at the site. Shaking endangers life and property by damaging or destroying structures and lifeline facilities.

Several faults are capable of producing strong ground motion in San Luis Obispo. These are the Los Osos, Point San Luis, Black Mountain, Rinconada, Wilmar, Pecho, Hosgri, La Panza, and San Andreas faults (Figure 4). The San Andreas Fault and the offshore Hosgri Fault, which present the most likely source of ground shaking for San Luis Obispo, have a high probability of producing a major earthquake within an average lifespan. The highest risk from ground shaking is found on deep soils that were deposited by water, are geologically recent, and have many pore spaces among the soil grains. These are typically in valleys (Figure 5).

Engineering standards and building codes set minimum design and construction methods for structures to resist seismic shaking. Model standards and codes are typically updated every few years at the recommendation of professional advisors, in response to review of the performance of structures and lifelines that have been subject to recent earthquakes. Local governments then amend or replace their codes to reflect those required by State law or recommended.

Settlement and Liquefaction

In this context, settlement means the ground supporting part of a structure or facility lowers more than the rest or becomes softer, usually because ground shaking reduces the voids between soil particles (and often with groundwater rising in the process). The result can be more strain on the supporting features than they were built to withstand, leading to cracked walls or floors and broken water and sewer lines. Liquefaction is the sudden loss of the soil's supporting strength due to groundwater filling and lubricating the spaces between soil particles as a result of ground shaking. Soils with high risk for liquefaction are typically sandy and in creek floodplains or close to lakes. In extreme cases of liquefaction, structures can tilt, break apart, or sink into the ground. The likelihood of liquefaction increases with the strength and duration of an earthquake.

The soils in the San Luis Obispo area that are most susceptible to ground shaking, and which contain shallow ground water, are the ones most likely to have a potential for settlement and for liquefaction (Figure 5). The actual risk of settlement or liquefaction needs to be identified by investigation of specific sites, including subsurface sampling, by qualified professionals. Previous investigations have found that the risk of settlement for new construction can be reduced to an acceptable level through careful site preparation and proper foundation design, and that the actual risk of liquefaction is low. (An example is the City's fire station at Madonna Road and Los Osos Valley Road.)

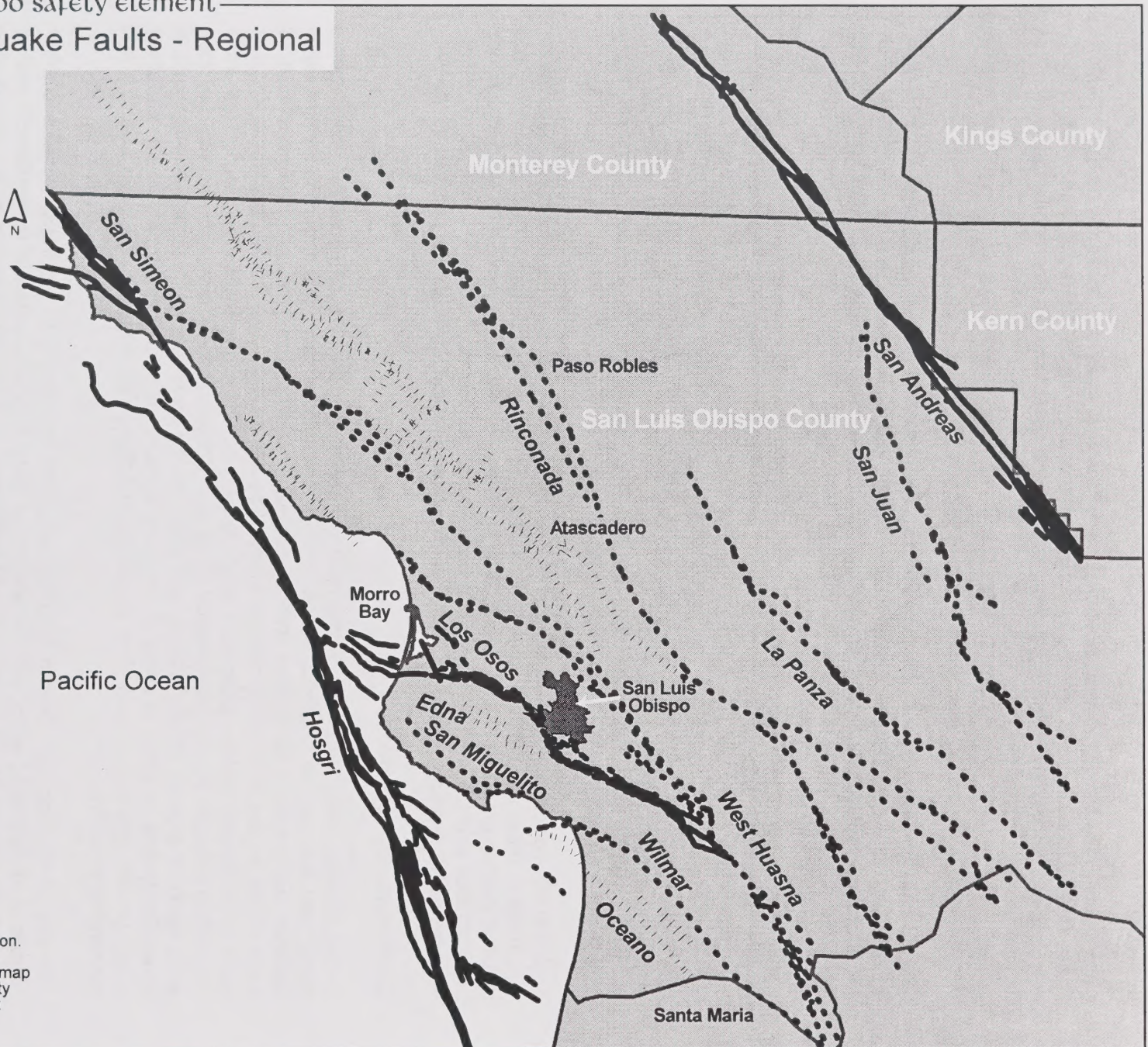
Figure 4: Earthquake Faults - Regional

Mapped and inferred faults

- Inactive
- Potentially active
- Active

10 kilometers

5 miles



This map is for general information. It reflects the County and Cities 1999 Draft Safety Element. The map by itself is not a statement of City policy. It may be revised without amending the Safety Element.

The building code requires site-specific investigations and design proposals by qualified professionals in areas that are susceptible to settlement and liquefaction.

Slope Instability and Landslides

Slope instability can occur as a gradual spreading of soil, a relatively sudden slippage, a rockfall, or in other forms. Causes include steep slopes, inherently weak soils, saturated soils, and earthquakes. Improper grading and man-made drainage can be contributing factors. Slope instability may result in gradual or sudden damage to buildings, roads, and utility lines. Sudden movement can be a threat to lives through immediate injury or suffocation, or loss of access.



In the late 1990's, rain-saturated soil moved above houses on the Santa Lucia foothills.

Much of the development in San Luis Obispo is in valleys, where there is low potential for slope instability. However, the city contains extensive hillsides. Several are underlain by the rocks of the Franciscan group, which is a source of significant slope instability. The actual risk of slope instability needs to be identified by investigation of specific sites, including subsurface sampling, by qualified professionals.

The building code requires site-specific investigations and design proposals by qualified professionals in areas that are susceptible to slope instability and landslides.

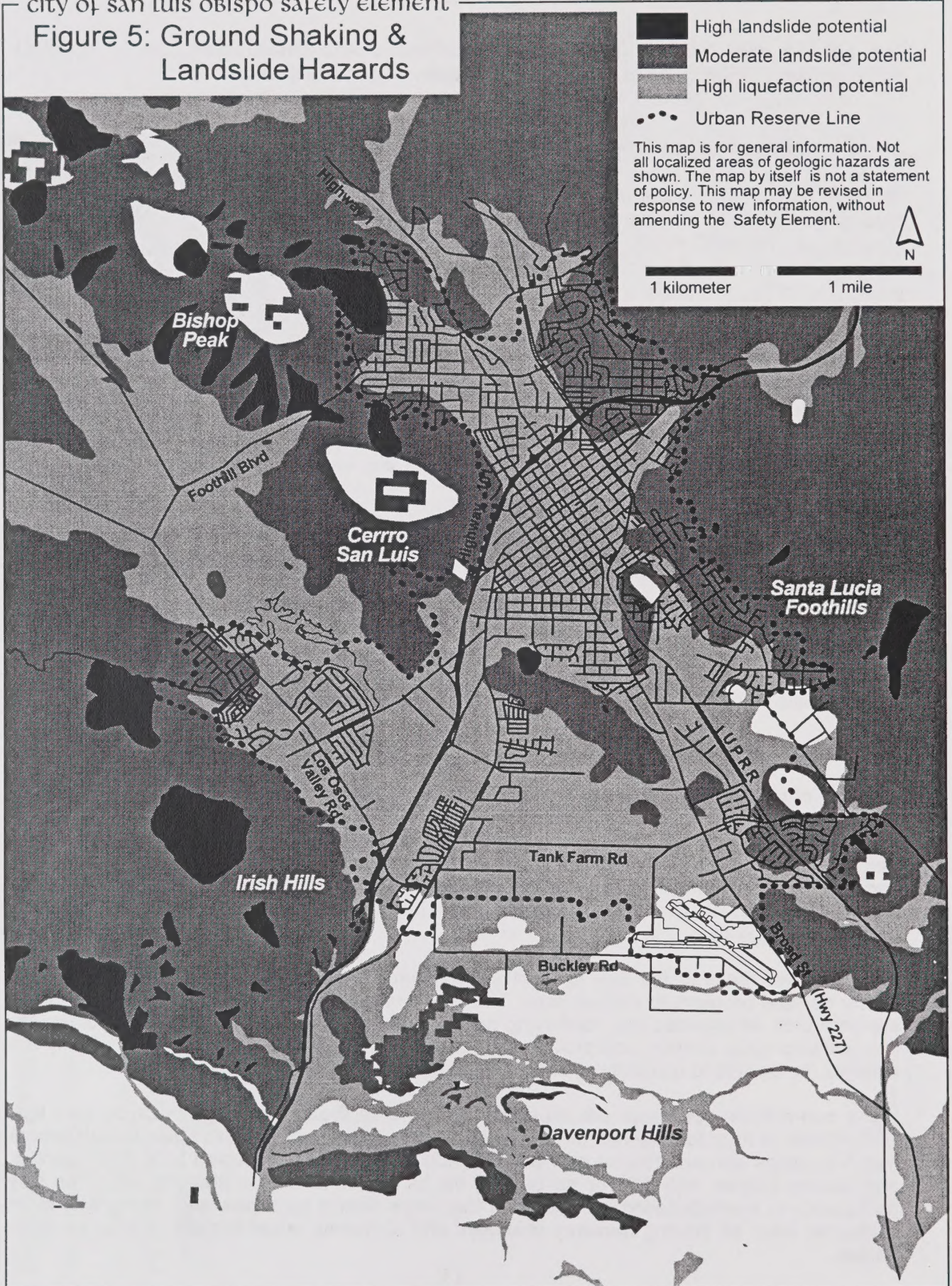
Damage-prone Buildings

Any type of building can be damaged in an earthquake, but some types are much more able to withstand quakes. In the past, many buildings were constructed of clay blocks, bricks, stone, or concrete blocks, with few or no steel members to resist separation of the masonry units. The weight and lack of connectivity within these unreinforced masonry buildings make them a particular threat to safety in an earthquake. Because many unreinforced masonry buildings have historic and architectural value, and contain viable businesses, there is reluctance to remove or replace them quickly.

State law has required the City to identify unreinforced masonry buildings and implement a locally devised program to reduce risks. The City has surveyed them and required owners to evaluate their deficiencies and reinforcing needs. The City requires upgrades as buildings are remodeled or uses change, and provides fee credits to help offset some of the cost. A City law requires the owners to complete seismic upgrades or demolish the buildings by 2017.

Some non-masonry buildings are especially prone to earthquake damage because they lack connections to their foundations or resistance to side-to-side motion. Examples include wood-frame buildings with apartments over garages that have one side occupied by a door opening, and hillside houses with little or no bracing for tall supports on the downhill side. The City participates in a rehabilitation loan program that helps correct such problems, along with other measures such as bracing masonry chimneys and anchoring water heaters, mainly for older homes.

Figure 5: Ground Shaking & Landslide Hazards



Policy S 3.1: Avoiding Faults

Development shall not be located atop known faults. Applications for the following types of discretionary approvals within 100 meters (330 feet) of any fault that is previously known or discovered during site evaluation shall be subject to review and recommendation by a State-registered engineering geologist: change to a more intensive land-use designation; subdivision into five or more parcels; development of multifamily, commercial, industrial, or institutional buildings. (See also Policy S 8.3, Critical Facilities Locations.)

Policy S 3.2: Avoiding Slope Instability

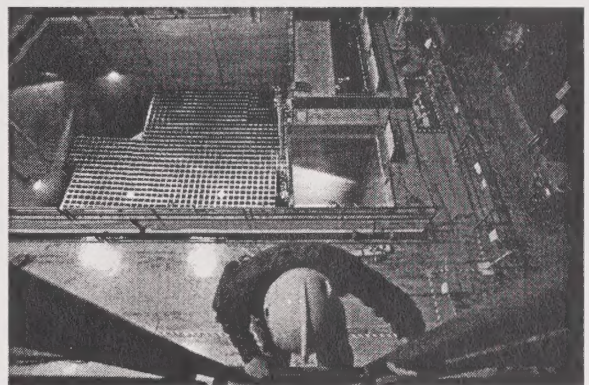
Development shall not be located on or immediately below unstable slopes, or contribute to slope instability. Any development proposed in an area of moderate or high landslide potential shall be subject to review and recommendation by a State-registered engineering geologist.

Policy S 3.3: Avoiding Liquefaction Hazards

Development may be located in areas of high liquefaction potential only if a site-specific investigation by a qualified professional determines that the proposed development will not be at risk of damage from liquefaction. The Chief Building Official may waive this requirement upon determining that previous studies in the immediate area provide sufficient information.

HAZARDOUS MATERIALS**Radiation Hazards**

Ionizing radiation damages tissues at the molecular and genetic levels, causing a host of illnesses and reproductive problems. The particular type of damage depends on the intensity and duration of exposure and the part of the body that is exposed. People have evolved in an environment that includes very low-level exposure to natural sources of radiation. Various sources can cause exposure to much higher levels.



Reactors and used-fuel storage at the Diablo Canyon power plant are only about five kilometers (three miles) from the offshore Hosgri earthquake fault.

The Diablo Canyon Power Plant is the primary hazard for ionizing radiation in the San Luis Obispo area. Risks result from the potential for mistakes during day-to-day operations, accidents associated with refueling, and damage from earthquakes or other causes. There is added risk from on-site storage of spent fuel that remains radioactive for several generations. Long-term, off-site storage facilities for spent fuel are not available. A release of radioactive material could seriously damage health and make property unusable. The plant operator and local agencies have jointly prepared plans for warning, sheltering, evacuation, and other responses to radiation emergencies. Updated information regarding the Emergency Response Plan is distributed to the public each year. The plant is regulated by the Federal Government. Land close to the plant, and downwind from it under prevailing conditions, is under County jurisdiction.

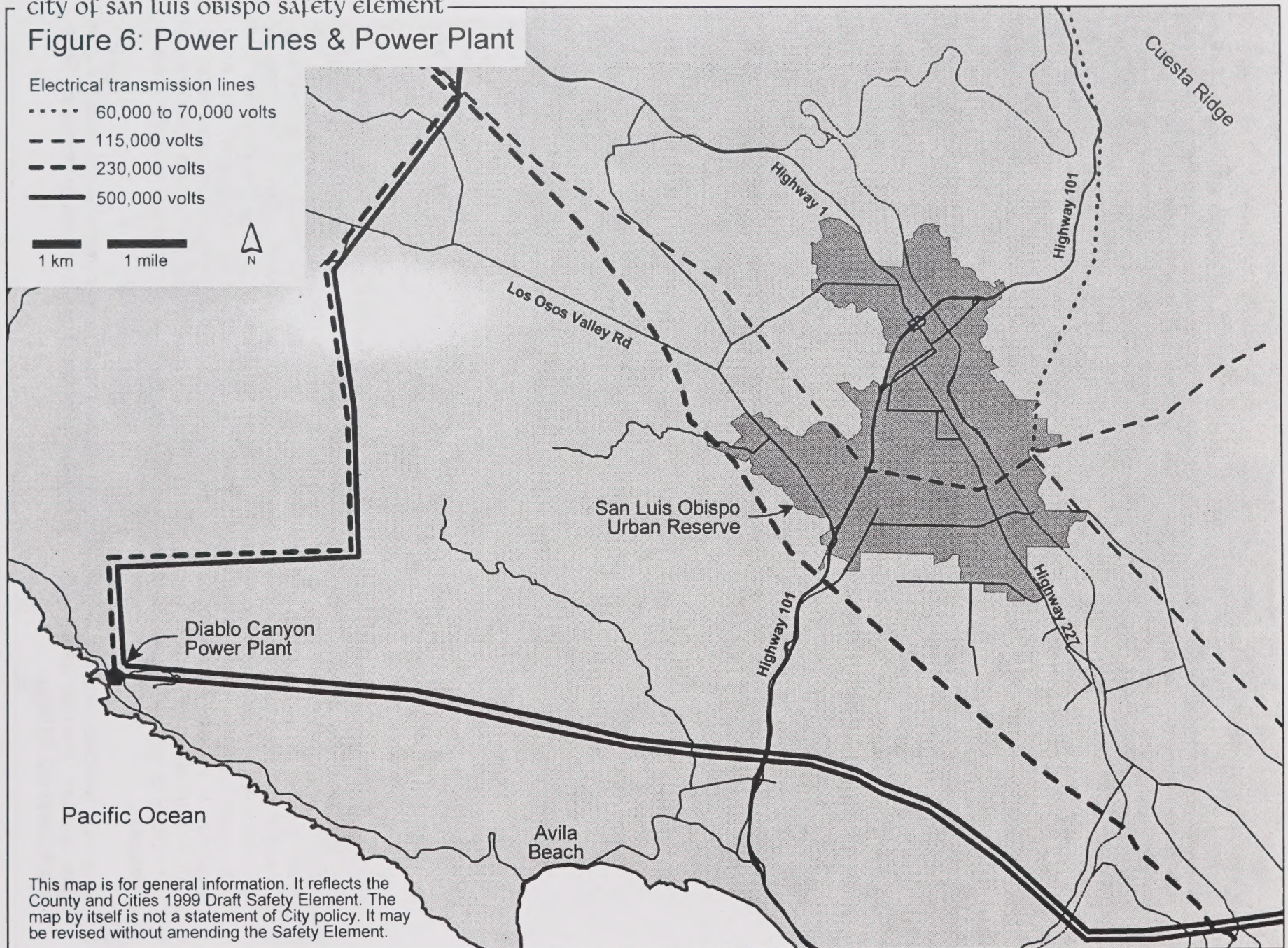
Relatively low-level radioactive materials and waste result from some medical facilities and other sources. The use, transportation, and disposal of these materials are governed by State and Federal regulations.

Figure 6: Power Lines & Power Plant

Electrical transmission lines
..... 60,000 to 70,000 volts
----- 115,000 volts
----- 230,000 volts
===== 500,000 volts

1 km

1 mile



This map is for general information. It reflects the County and Cities 1999 Draft Safety Element. The map by itself is not a statement of City policy. It may be revised without amending the Safety Element.

Radon is a naturally occurring gas produced by the breakdown of traces of uranium in certain soils and rocks. This gas can accumulate inside structures where building materials emit or trap radon, posing a significant health hazard. Soils and rocks in the San Luis Obispo area are not known to be sources of radon, so it is not considered a substantial local hazard.

Other Hazardous Materials

Hazardous materials include a wide range of solids, liquids, and gases that are flammable, explosive, corrosive, or toxic. Because large amounts of hazardous materials are shipped through the San Luis Obispo area daily, transportation accidents pose the most significant hazardous material risk to City residents and the environment. Hazardous materials are transported along highways, the railroad, and pipelines, which pass through the city.

Public exposure to hazardous materials also can result from their use by industry, agriculture, and services. In 1999, there were about 145 businesses in the City using hazardous materials in sufficient quantities to require filing a report with the Fire Department, as required by the California Health and Safety Code. Household use of hazardous materials is also a threat to health and the environment.

In 1995, members of the Hazardous Materials Response Team collect samples following a truck accident at Madonna Road and Los Osos Valley Road.



Policy S 4.1: Minimizing Hazardous Materials Exposure

People's exposure to hazardous substances should be minimized.

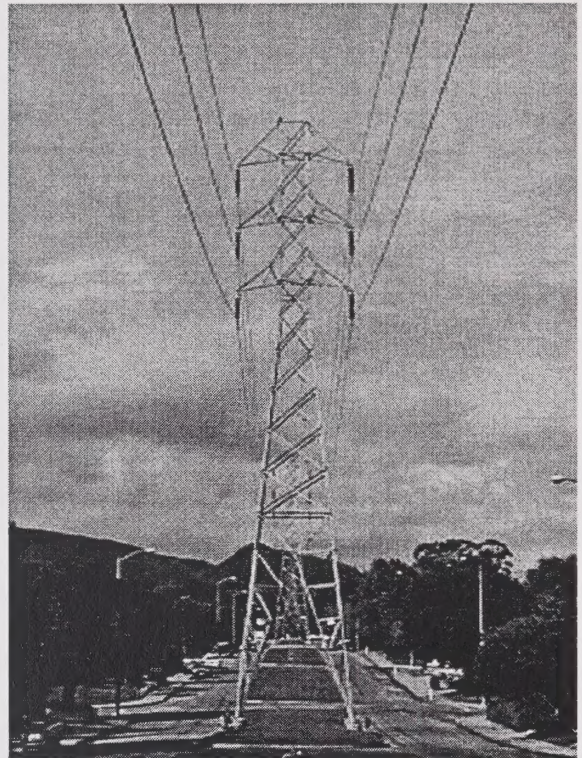
Policy S 4.2: Hazardous Materials in City Operations

The City should avoid using hazardous materials in its own operations to the greatest extent practical, and will follow all established health and safety practices when they are used.

ELECTROMAGNETIC FIELDS

The flow of electricity through a conductor creates electromagnetic fields (EMF's). These fields form around power transmission and distribution lines, wiring in buildings, and equipment and appliances used at home and in businesses. The strength of an electromagnetic field depends mainly on the voltage in the conductor, and declines with distance from the conductor. Other EMF characteristics depend on the type of current (alternating or direct) and the frequency of alternation. While an EMF from one conductor may interact with and in effect "neutralize" an EMF from another conductor, there is generally no way to shield against EMF exposure.

High-voltage power lines extend through parks, a shopping center, and residential neighborhoods in the southern part of the city.



Studies of the relationships between exposure to EMF's and illness have shown that there is cause for concern, especially from long-term exposure to strong fields. The mechanisms for the harmful effects have not been clearly defined. But it is known that all life processes involve electromagnetic interactions at the cellular and molecular level, and fields from external sources may interfere with these processes. The studies appear to show that there is not a clear dose-response relationship. In other words, unlike ingesting a toxin, there is not a simple progression of harm as the amount ingested increases.

The California Department of Health Services has recommended that, until information is available to make better-informed decisions about possible health effects due to long-term EMF exposure, people and local governments should consider keeping schools, dwellings, and workplaces away from high-voltage power transmission lines. With this approach, exposure to strong EMF's would be avoided through location choices when it is practical, inexpensive, and simple to do so.

Figure 6 shows the high-voltage power transmission routes in the San Luis Obispo area.

Policy S 5.1: Exposure to Electromagnetic Fields

Land-use decisions should avoid prolonged exposure of people to strong electromagnetic fields. Appropriate uses for areas under or next to high-voltage power transmission lines are agriculture, floodwater detention, roads, parking, materials storage, and parks and greenways with low-intensity use. Residential yards may be located along but outside of high-voltage power transmission line easements. School buildings and playgrounds, residential buildings, and work places should be set back from high-voltage power transmission lines. The amount of setback will be a matter of judgment, considering the space available in which to locate uses within the site being planned.

Policy S 5.2: Notification to Buyers Near Electromagnetic Fields

When land containing major sources of electromagnetic fields, such as power transmission lines, is subdivided, the City will determine if a condition will be imposed requiring notification of prospective buyers that a source of electromagnetic fields exists and that studies have raised concerns about long-term exposure.

AIRPORT HAZARDS

The San Luis Obispo County Airport provides commuter, charter, and private service to the area (Figure). The primary hazard associated with the airport is the risk of aircraft crashing on approach and take-off. Aircraft flight operations are determined largely by the physical layout of the airport and rules of the Federal Aviation Administration. Activities on the airport property are managed by the County.



In April 1998, a private plane made an emergency landing on Los Osos Valley Road west of Foothill Boulevard, narrowly missing power lines and cars.

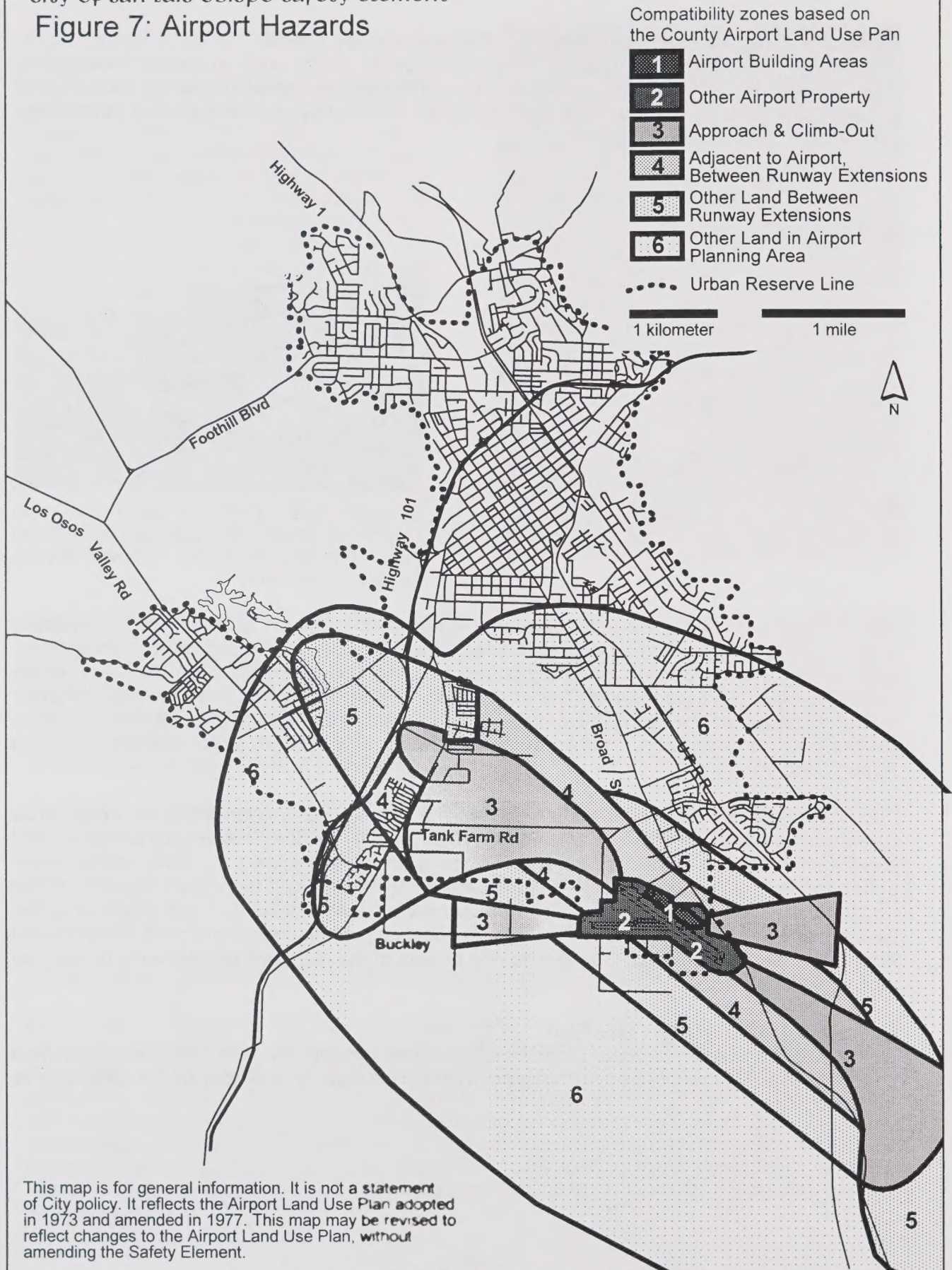
Existing land uses under the approach and take-off paths include agriculture and businesses close to the airport, and shopping centers, dwellings, and schools at greater distances. State law requires the independent, countywide Airport Land Use Commission to adopt an Airport Land Use Plan. This plan establishes zones based on flight patterns, with the aim of having future development be compatible with airport operations, considering safety and noise exposure. State and County policies encourage future development to be consistent with the Airport Land Use Plan.

The City's General Plan Land Use Element designates land-use categories that are meant to be consistent with the Airport Land Use Plan. When the City comprehensively updated its Land Use Element in 1994, the Airport Land Use Commission was preparing an update of the Airport Land Use Plan. When this Safety Element was adopted in 2000, the Airport Land Use Plan update had not been completed. There were some discrepancies between the City's Land Use Element and the Airport Land Use Plan, mainly affecting potential residential development in the Margarita Specific Plan Area. Changes to one or both of the plans will be needed to resolve the inconsistencies.

Policy S 6.1: Airport Land Use Plan

Development should be permitted only if it is consistent with the San Luis Obispo County Airport Land Use Plan. Prospective buyers of property that is subject to airport influence should be so informed.

Figure 7: Airport Hazards



This map is for general information. It is not a statement of City policy. It reflects the Airport Land Use Plan adopted in 1973 and amended in 1977. This map may be revised to reflect changes to the Airport Land Use Plan, without amending the Safety Element.

HAZARDOUS TREES

Trees help make San Luis Obispo attractive for people and wildlife. However, as trees age, particularly massive or tall ones, they pose a risk from dropping limbs or toppling. Strong winds, and saturated soils or erosion around roots, contribute to the hazard. Falling branches or whole trees can harm people, damage property, and interrupt access, storm runoff, and power and communications. Particularly for some types of pines in the San Luis Obispo area, pitch canker is killing trees in a relatively short time. The weakened or dead trees increase the hazard.



In February 1998 a large eucalyptus tree fell across Meadow Street, creating a clean-up challenge but causing no injuries or serious damage.

The City trims trees along streets and on City parks and grounds, with safety as one objective. The City also notifies property owners of hazardous trees, and works with owners, the local flood control district, and State programs to deal with trees along creeks.

Policy S 7.1: Hazardous Trees

Minimize danger to people and property from trees that are weakened and susceptible to falling or limb loss during storms.

Program S 7.2: Hazardous Trees

The City will identify, and maintain or remove, trees on City property to minimize hazards, and will work with property owners to do the same.

AVOIDING AND PREPARING FOR EMERGENCIES IN GENERAL

Even if the City did not have this Safety Element, it would have in place many programs and requirements intended to avoid several kinds of emergencies and to respond to those that occur. This element does not repeat in detail those programs. Instead, it contains broad policies and programs reflecting the City's commitment to achieving acceptable levels of risk.



Citizen volunteers learn how to remove a victim trapped under a heavy object during Community Emergency Response Training.

Policy S 8.1: Avoiding and Mitigating Hazards [reworded from the Open Space Element]

- A. *Development, including access and utility systems, shall be directed away from hazardous areas, which should be designated for appropriate open space or park uses.*
- B. *Where development, including access and utility systems, cannot avoid hazardous areas, the development shall adequately mitigate the hazards.*
- C. *Hazard mitigation measures shall not significantly impact the environment, including wildlife habitats and views.*
- D. *Development shall pay an equitable share of the costs to mitigate areawide hazards.*
- E. *Hazard mitigation measures shall not burden taxpayers with high maintenance costs.*
- F. *Development shall not increase hazards for other properties in the area.*

Policy S 8.2: Emergency Preparedness and Response

There should be adequate planning, organization, and resources for emergency preparedness and emergency response.

Program S 8.2.1: City Activities

The City's Disaster Preparedness Committee will be responsible for planning and coordinating City preparedness activities. (This committee is comprised of the Fire Chief and representatives of the police, public works, utilities, and administration departments.) With direction from the Disaster Preparedness Committee, the Fire Chief will maintain and annually update a basic plan for emergency response.

Program S 8.2.2: Response Performance Standards

- A. *The City will evaluate fire-flow capacities and identify deficiencies through testing and modeling of the water system. For identified deficiencies, the Utilities Department will propose remedies to meet recommended service levels based on Insurance Service Organization ratings and other objective criteria.*

Discussion

To effectively fight fires, water must be available sufficiently close to the fire, at a sufficient rate, for a sufficient duration. The City's water system is typically designed and operated so the Fire Department personnel and equipment responding to a fire

in one structure can at least prevent the fire from spreading to nearby structures. Automatic fire sprinklers, which are required in nearly all new buildings, greatly reduce the likelihood that a fire will consume a structure or threaten other structures. First-response fire equipment often carries water or chemical extinguishers that can be used to extinguish or contain small fires, especially where the fire is at the edge of the city or where the water system may not meet recent standards. Land Use Element policies discourage development beyond the area that can be served by the gravity-supplied water system, because public or private pump-fed systems that may be adequate for domestic use are usually not adequate for fire-fighting, and can support a sustained fire-fighting effort only if there is on-site water storage that fire engines can pump from.

The City's water system is typically not designed to fight a wildland fire some distance from the developed area, or approaching on a broad front and threatening scores of buildings. The City relies on mutual and automatic aid, including special equipment such as aerial tankers, in these situations.

An earthquake that damages many structures would probably start several fires and cause some leaks in the water system. The City tries to avoid the injury and property loss that could occur in this situation by:

- Replacing old water mains, valves, and hydrants. Newer materials and properly back-filled trenches reduce the chances for breaks and leakage.
- Requiring looped water mains in new development areas, so leaks can be isolated while preserving water service in most of the area.
- Requiring new buildings to have fire detection and suppression systems, and fire-resistive construction.
- Training citizens to deal with emergencies at times when professional responders would be overwhelmed.

The Water and Wastewater Management Element of the General Plan identifies the annual water supply needed for the entire city currently and at build-out of the Land Use Element. Municipal Code Chapter 2.44, "Development Impact Review Procedures," requires that the adequacy of services, including water for fire fighting, be addressed for each proposed development. In 2000, the City prepared a new Water System Master Plan. This plan focuses on the facilities needed to correct existing deficiencies and to serve new development. The draft plan recommended the following safety-related items:

- For the Stenner Canyon Water Treatment Plant, improved emergency standby power, a seismic evaluation of the existing treated water storage and clearwell facilities, and evaluation of means to protect the water treatment plant from railroad accidents.
- To serve the Margarita and Airport areas, about 10 kilometers (six miles) of new water mains.
- To serve the southwestern part of the city, a 6-million-liter (1.6-million-gallon) water tank.

The following response-time programs are intended to apply to recurrent types of emergencies, not rare, areawide disasters.

- B. The Fire Department has set a response-time objective of four minutes. (The Fire Department's standard of coverage recommends that a three-person engine company, with paramedic, meet this standard 95 percent of the time.)*
- C. The Police Department has set a 30-percent available-time objective for patrol response. ("Available time" is the fraction of total time that a patrol unit is not previously assigned or otherwise unavailable for response to a new emergency call for service.)*
- D. The Public Works Department and the Utilities Department will set response-time objectives, based on the values at risk and acceptable levels of risk, and will work to achieve the objectives. (Typical incidents requiring timely response are water main breaks and large trees down in the street.)*

Program S 8.2.3: Staff Training

- A. The City will train fire fighters, police officers, building inspectors, and public works and utilities staff to levels appropriate for their tasks and responsibilities.*
- B. The City will provide training for those of its staff who apply its building regulations and planning standards, emphasizing the lessons learned in locations that have experienced disasters.*
- C. The City will conduct disaster-response exercises for the types of non-nuclear disasters discussed in this element, coordinated with participation in required, periodic nuclear-disaster response training exercises.*

Program S 8.2.4: Specific Emergency-Response Information

The City will obtain information about the specific location and type of fire and toxics hazards and values at risk, and use the information in its preparedness and response actions.

Program S 8.2.5: Coordinated Emergency Planning

- A. The City will work within the Standardized Emergency Management System, an emergency response and coordination system used throughout California. The City will participate in periodic disaster-response drills, on a regional basis with all involved jurisdictions and involving the news media.*
- B. The City will review the hazard assessment studies and emergency response plans of utilities and of transportation agencies and companies operating in the San Luis Obispo area, and update the City's Emergency Plan, including evacuation routes, as necessary.*
- D. The City will work with Caltrans to assure transport of hazardous materials follows Caltrans-approved routes, with all necessary safety precautions taken to prevent hazardous materials spills.*

Program S 8.2.6: Emergency Operations Center

The City will maintain an Emergency Operations Center Plan, to prescribe the intended activation and operation of a single facility from which disaster response will be managed. The Headquarters Fire Station will serve as the Emergency Operations Center, with the Corporation Yard and the Police Station serving as back-up emergency operations centers or as department operating centers.

Program S 8.2.7: Information and Planning Updates

Working with other agencies in the area, the City will expand and keep current safety-related information. The City will use sufficiently detailed analysis of hazards, and will update the City's safety and emergency plans as new information becomes available.

Program S 8.2.8: City Emergency Plan

The City will keep current and implement its Multihazard Emergency Response Plans, as required by the California Emergency Services Act, with the objectives of:

- Saving lives and protecting property
- Providing a basis for direction and control of emergency operations
- Assuring the continuity of government
- Repairing and restoring essential systems and services (such as water supplies)
- Providing for the protection, use, and distribution of resources that are available immediately after a disaster
- Making the City as self-reliant as possible following a major disaster.
- Coordinating operations with other local jurisdictions

Program S 8.2.9: Mutual and Automatic Aid

The City will work with other jurisdictions to obtain and follow adequate mutual-aid and automatic-aid agreements.

Program S 8.2.10: Disaster Recovery

The City will prepare for post-disaster recovery, including measures to address:

- Prompt assessment of the condition of buildings and utilities;
- Temporary shelter for displaced residents, including the potential for sites on parks or other public land;
- Temporary facilities for non-critical public services;
- Recovery of inventory and records from damaged commercial buildings;
- Temporary facilities for displaced businesses and not-for-profit organizations;
- Removal, reconstruction, or replacement of unsafe buildings, including historically or architecturally significant buildings;
- High volumes of planning and building applications;
- High demand for public capital improvement spending to replace damaged facilities or to take advantage of opportunities to implement longer-range plans.

Policy S 8.3: Critical Facilities Locations

A. The following City facilities that are necessary for community function and emergency response will not be located in 100-year floodplains, in areas of high or extreme wildland fire hazard, on sites subject to liquefaction or landslide [as distinguished from areas with potential for these hazards], atop earthquake faults or within State-designated special studies zones, or in airport inner safety zones or outer safety zones:

- fire stations
- police main station
- water treatment plant
- wastewater treatment plant
- public works and utilities corporation yards
- principal telecommunications facilities

B. The following facilities operated by entities other than the City, which are necessary for community function and emergency response, should not be located in 100-year floodplains, in areas of high or extreme wildland fire hazard, on sites subject to liquefaction or landslide [as distinguished from areas with potential for these hazards], atop earthquake faults or within State-designated special studies zones, or in airport inner safety zones or outer safety zones:

- hospitals
- Caltrans and utilities corporation yards
- principal electrical substations
- principal natural gas transmission mains and pumping stations
- principal public-utility telecommunications and emergency broadcast facilities

Policy S 8.4: Emergency Access and Evacuation

Substantial development will be allowed only where multiple routes of road access can be provided, consistent with other General Plan policies on development location and open space protection. "Substantial development" means industrial, commercial, and institutional uses, multifamily housing, and more than ten single-family dwellings. "Multiple routes" include vehicle connections that provide emergency access only, as well as public and private streets.

Discussion

The City has determined that its roadway policies and standards provide adequate opportunities for evacuation and emergency access, considering the conditions and types of development planned for the city. Policies on connectivity are found in the Land Use Element (policies 2.1.4 and 2.2.12). Design standards are found in the Circulation Element (Part 5) and Subdivision Regulations (Municipal Code Chapter 16.36, Article II). When this Safety Element was last revised, some areas that were developed before the current policies and standards were adopted did not have the desired access. Those areas and proposed access improvements are listed below.

Area	Deficiency	Proposed Improvement
Royal Way	One way out to Los Osos Valley Road for about 200 dwellings, 25 of which are adjacent to an area of moderate wildland fire hazard.	Emergency access only at Quail Drive, through the DeVaul Ranch project.
Margarita Avenue	One way out to South Higuera Street for about 250 dwellings.	Public streets and emergency-drive access through future development in the Margarita Specific Plan Area.
Los Verdes tracts	One way out to Los Osos Valley Road for two tracts each with 88 dwellings, and one way out to South Higuera Street for one tract with 93 dwellings, under an aircraft climb-out path.	None proposed, due to "enclave" design of tracts and creek channel. Future development west of the Los Osos Valley Road tracts may provide an opportunity for emergency-only access.
Chumash Village mobile home park	One way out to South Higuera Street for 239 dwellings.	Potential for an emergency-only access to the east through the Margarita Specific Plan Area is being evaluated.
Villa Fontana	One way out to South Higuera Street for 54 dwellings.	None proposed, due to "enclave" design of tract, topography and adjacent development.

Policy S 8.5: Preparedness Education

Citizens should be well informed of hazards and ways to minimize the effects of disasters. Special attention should be given to children, seniors, and handicapped.

Program S 8.5.1: Citizen Information and Training

- A. The City will help inform homeowners about local fire hazards, appropriate responses to fire, and ways to prevent loss, including home improvements that can reduce the impact of fire.
- B. The City will promote the efforts of the Fire Safe Council.
- C. The City will continue the Community Emergency Response Team (CERT) training as effective preparation for residents to aid themselves when needs exceed the availability of professional emergency response workers.
- D. The City will support education programs in the lower grades, using displays and demonstrations to inform young children about fire safety, and in secondary schools, demonstrating the dynamic aspects of fire, including major factors contributing to fire hazard and the relationship of fire to the natural ecology. Fire prevention and evacuation lessons will be included in each program.

Program S 8.5.2: Other Organizations

The City will help organizations that provide emergency outreach and education programs in the area, will help schools teach children how to avoid dangers and how to behave during an emergency, and will encourage other organizations dealing with large groups (such as seniors and handicapped) to develop their own emergency education and response programs.

Program S 8.5.3: Voluntary Inspections

The City will encourage and participate in programs to inspect individual houses, particularly those occupied by the elderly or handicapped, including encouraging occupants to check their own smoke detectors.

Policy S 8.6: Safety of Structures and Facilities

Existing and new structures and facilities should reflect adopted safety standards.

Program S 8.6.1: Reducing Structural Hazards

The City will identify and evaluate hazards in existing structures and work toward reducing those hazards to acceptable levels of risk. The City will advocate that other organizations and agencies do the same. Highest priority will be given to critical facilities (listed in Policy 8.3) and transportation facilities. This overall effort has five basic components:

- A. The City's continuing steps to evaluate, maintain, and replace its own facilities, in particular bridges, public assembly rooms, fire stations, water tanks, and water and wastewater treatment plants.
- B. Routine inspections for code compliance in commercial, industrial, public-assembly, group-housing, and multifamily residential buildings.
- C. Complaint-based inspections for code compliance in all buildings.
- D. Implementation of the City-adopted program to identify and mitigate hazards of unreinforced masonry buildings.
- E. Subject to adequate resources being provided through the budget process, outreach for private, wood-frame buildings involving attachments to adequate foundations, cripple-wall bracing, water-heater attachment, and bracing or attachment of masonry chimneys.

Program S 8.6.2: Planning Standards

The City will maintain and administer its zoning and subdivision standards and architectural guidelines in conformance with the General Plan. The standards and guidelines will be consistent with the requirements and recommendations of City police and fire departments.

Program S 8.6.3: Development Review

City fire, police, public works, and utilities personnel will review applications for subdivisions and development projects, for consistency with safety objectives.

Program S 8.6.4: Building and Fire Regulations

The City will maintain and administer its building and fire regulations in conformance with State requirements, including adoption of updated editions of uniform codes.

Program S 8.6.5: Required Inspections

The City will conduct safety inspections for fire and hazardous materials in commercial, industrial, and multifamily residential buildings.

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